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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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SMITH INTERNATIONAL PATENT APPLICATIONS
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EXAMINER	
MCNELIS, KATHLEEN A	
ART UNIT	**PAPER NUMBER**
1742	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	09/494,877	FANG ET AL.	
	Examiner	Art Unit	
	Kathleen A. McNelis	1742	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 August 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,7,11-14,19-21,25-27,29,32-34,37 and 41-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,7,11-14,19-21,25-27,29,32-34,37 and 41-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Claims Status

Claims 1, 7, 11-14, 19-21, 25-27, 29, 32-34, 37 and 41-44 remain for examination where claims 1, 14, 25, 33, 43 and 44 are amended.

Acknowledgement of RCE

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CRF 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 08/02/2007 has been entered.

Status of Previous Rejections

The following rejections are withdrawn in view of amendments to or cancellation of the claims:

- Claims 1, 2, 4, 7, 14, 15, 17, 19, 20, 25-27, 32, 33, 37, and 41-43 under 35 U.S.C. 102(a) or 102 (e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Fang et al. (U.S. Pat. No. 5,880,382) in view of AMETEK Sealvar® Tech Brief (AMETEK),
- Claims 11-13, 21, 34 and 44 under 35 U.S.C. 103(a) as obvious over Fang et al. (U.S. Pat. No. 5,880,382) in view of AMETEK Sealvar® Tech Brief (AMETEK) as applied to claims 1, 33 and 43,
- Claims 5 and 18 under 35 U.S.C. 103(a) as obvious over Fang et al. (U.S. Pat. No. 5,880,382) in view of AMETEK Sealvar® Tech Brief (AMETEK) as applied to claims 1 and 14 and further in view of Heinrich et al. (U.S. Pat. No. 6,024,776),
- Claims 15-17, 43 and 44 under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125), and

- Claims 5 and 18 under 35 U.S.C. 103(a) as obvious over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125) as applied to claims 1 and 14 and further in view of Heinrich et al. (U.S. Pat. No. 6,024,776).

The following rejections are maintained:

- Claims 1-4, 7, 11, 12, 14 and 19-21 under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125),
- Claims 13, 33, 34, 37, 41 and 42 under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125) as applied to claim 1, and further in view of Great Brittan patent 2 273 301 (GB '301) or Liang et al. (U.S. Pat. No. 6,197,084) or Fang et al. (U.S. Pat. No. 5,880,382),
- Claims 25-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125) and Fang et al. (U.S. Pat. No. 5,880,382),

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-4, 7, 11, 12, 14 and 19-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125).

GB '654 in view of EP '125 is applied as discussed in the 04/02/2007 Office action. Regarding the amended limitation to claims 1, 14 reciting "consisting essentially of tungsten carbide (WC)" GB '654 discloses tungsten carbide with a minor addition of 0.5 to 1.0% of tantalum carbide (p. 2 lines 7-20), if applicant contends that additional materials in the prior art are

excluded by the recitation of "consisting essentially of, applicant has the burden of showing that the introduction of additional components would materially change the characteristics of applicant's invention (see M.P.E.P. 2111.03).

Claims 13, 33, 34, 37, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125) as applied to claim 1, and further in view of Great Brittan patent 2 273 301 (GB '301) or Liang et al. (U.S. Pat. No. 6,197,084) or Fang et al. (U.S. Pat. No. 5,880,382).

GB '654 in view of EP '125 and further in view of GB '301 or Liang et al. or Fang et al. is applied as discussed in the 04/02/2007 Office action.

Regarding the amended limitation to claim 33 reciting "consisting essentially of tungsten carbide (WC)" GB '654 discloses tungsten carbide with a minor addition of 0.5 to 1.0% of tantalum carbide (p. 2 lines 7-20), if applicant contends that additional materials in the prior art are excluded by the recitation of "consisting essentially of, applicant has the burden of showing that the introduction of additional components would materially change the characteristics of applicant's invention (see M.P.E.P. 2111.03).

Claims 25-27 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Great Brittan patent 1 450 654 (GB '654) in view of European Patent 0 085 125 (EP '125) and Fang et al. (U.S. Pat. No. 5,880,382).

GB '654 in view of EP '125 and Fang et al. is applied as discussed in the 04/02/2007 Office action.

Regarding the amended limitation to claim 25 reciting "consisting essentially of tungsten carbide (WC)" GB '654 discloses tungsten carbide with a minor addition of 0.5 to 1.0% of tantalum carbide (p. 2 lines 7-20), if applicant contends that additional materials in the prior art are

excluded by the recitation of "consisting essentially of, applicant has the burden of showing that the introduction of additional components would materially change the characteristics of applicant's invention (see M.P.E.P. 2111.03).

Claims 25-27, 32, 33, 37, and 41-43 are rejected under 35 U.S.C. 103(a) as obvious over Fang et al. (U.S. Pat. No. 5,880,382).

Fang et al. discloses a low CTE cermet (col. 7 lines 5-10) of a double-cemented carbide composites (abstract) comprising:

1. Grains, where the grains are carbides, preferably tungsten carbides (abstract and col. 2 lines 21-33), which correspond to the "first phase" of the instant claims.
2. A first ductile phase selected from the group consisting of Co, Ni, Fe alloys thereof and alloys with materials selected from the group consisting of C, B, Cr, Si and Mn (abstract and col. 2 lines 21-33) which corresponds to the "second phase" of the instant claims, and
3. A second ductile phase selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb and alloys thereof with materials selected from the group consisting of C, B, Cr and Mn where cobalt is the preferred ductile phase (col. 2 lines 33-42) which corresponds to the "third phase" where applicable in the instant claims.
4. Selection of a low thermal expansion ductile binder of less than about 8 μm/m-K (i.e. ppm/K or ppm/°C) so that the binder is thermally compatible with the hard phase particles (col. 7 lines 1-20).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to select an alloy from the group of first ductile phase alloys having CTE of < 8 ppm/ °C since Fang et al. discloses the use of this limit to ensure thermal compatibility of the composite. The range of < 8 ppm/ °C is within the range of < 10 ppm/ °C (claim 25) and the conventional WC-Co range (claim 26) and overlaps the claimed range of < 6 ppm/ °C (claim 27); therefore a

prima facie case of obviousness exists (M.P.E.P. § 2144.05). It would have been obvious to one of ordinary skill in the art at the time the invention was made to select an alloy having CTE of 6 ppm/ °C or less since Fang et al. teaches equal utility over the range of < 8 ppm/ °C.

Claims 25-27 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over European patent document 0 058 125 (EP '125).[1]

With respect to claim 25, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% and consists of about 5-20 wt% Ni, 5-20 wt% Mn, up to 2% C, and balance iron (p. 9 lines 1-5) useful for drilling through rock (p. 9 lines 23-25) and where the composite is sintered (p. 9 lines 29-33). Tungsten carbide disclosed by EP '125 corresponds to the "first phase" in instant claim 27. Instant claim 25 defines the "second phase" as a mixture of metals selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr and Mn and the "third phase" as selected from the group of materials consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, alloys thereof and alloys with materials selected from the group consisting of B, Cr and Mn, and further recites that first and second phase particles are distributed within the third phase. The elements Fe, C and Mn disclosed in EP '125 are broadly interpreted as the "second phase" with Ni as the "third phase." Since EP '125 discloses that the composition is mixed then sintered (p. 9 lines 25-33), particles of the first and second phases would be disbursed within the third phase.

Although EP '125 does not recite that the binder phase has a CTE of less than about 10 ppm/°C within a temperature range of from 100-700°C (claim 25) or less than conventional WO-Co at the same temperature and having the same metal binder content (claim 26) or less than about

[1] Examiner noted that the copy previously scanned into the record was missing pages. A new copy of EP '125 is included with this Office action.

6 ppm/°C (claim 27), such would be expected since the alloy of EP closely matches the instant claimed composition. When prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present (see M.P.E.P. 2112.01 II).

With respect to claim 32, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% which overlaps the instant range of 1 to 30% binder; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use between 10 and 20 wt% binder since EP '125 discloses equal utility over the range of 3 to 20%.

Claims 1, 7, 11, 12, 14, 19-21, 25-27, 29 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over European patent document 0 058 125 (EP '125) in view of Hale (U.S. Pat. No. 3,816,081).

With respect to claims 1, 11 and 14, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% and consists of about 5-20 wt% Ni, 5-20 wt% Mn, up to 2% C, and balance iron (p. 9 lines 1-5) useful for drilling through rock (p. 9 lines 23-25) and where the composite is sintered (p. 9 lines 29-33). The range of 3 to 20 wt% binder overlaps the claimed range of 10 to 30%; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

EP '125 does not disclose the addition of from 10 to 30 wt% Co to the metallic matrix (claims 1, 14 and 29).

Hale discloses a cemented tungsten carbide in an iron –carbon matrix, and discloses that the addition of nickel and cobalt to the essential Fe-C matrix improves abrasion resistance and strength (title, abstract and col. 2 lines 25-42). Hale discloses that the addition of between 5 and

15 wt% Co to the matrix improves abrasion resistance and strength (col. 2 lines 43-48). Improvement of strength and abrasion resistance would have been an obvious modification to materials used for drilling rocks. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 5 and 15 wt% Co as taught by Hale to the binder matrix of EP '125 to improve strength and abrasion resistance as taught by Hale and desired in EP '125. The range of 5 and 15 wt% Co overlaps the claimed range of 10 to 30 wt%; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

Although EP '125 in view of Hale does not recite that the binder phase has a CTE of less than about 10 ppm/°C within a temperature range of from 100-700°C (claims 1 and 20) or less than about 5 ppm/°C (claim 11) or less than about 2 ppm/°C (claims 12 and 21) or less than that of conventional WC-Co at the same temperature and having the same metal content at a temperature range of from 100-700°C (claim 14), however such would be expected since the alloy of EP '125 in view of Hale closely matches the instant claimed composition. When prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present (see M.P.E.P. 2112.01 II).

With respect to claims 7, 19 and 29, the range of 5-20 wt% Ni overlaps the instant claimed range of 10 to 40wt% Ni; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

With respect to claims 25-27, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% and consists of about 5-20 wt% Ni, 5-20 wt% Mn, up to 2% C, and balance iron (p. 9 lines 1-5) useful for drilling through rock (p. 9 lines 23-25) and where the composite is sintered (p. 9 lines 29-33). Tungsten carbide disclosed by EP '125 corresponds to the "first phase" in instant claim 27. Instant claim 25 defines the "second phase" as a mixture of metals selected from the group

consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr and Mn and the "third phase" as selected from the group of materials consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, alloys thereof and alloys with materials selected from the group consisting of B, Cr and Mn, and further recites that first and second phase particles are distributed within the third phase. The elements Fe, C and Mn disclosed in EP '125 are broadly interpreted as the "second phase" with Ni as the "third phase." The Co addition taught by Hale could be considered part or all of either the second or third phase, since Co is recited as in each. Since EP '125 discloses that the composition is mixed then sintered (p. 9 lines 25-33), particles of the first and second phases would be disbursed within the third phase.

Although EP '125 does not recite that the binder phase has a CTE of less than about 10 ppm/°C within a temperature range of from 100-700°C (claim 25) or less than conventional WO-Co at the same temperature and having the same metal binder content (claim 26) or less than about 6 ppm/°C (claim 27), such would be expected since the alloy of EP closely matches the instant claimed composition. When prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present (see M.P.E.P. 2112.01 II).

With respect to claim 32, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% which overlaps the instant range of 1 to 30% binder; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

Claims 1, 7, 11-14, 19-21, 25-27, 33, 34, 37, 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2273301 (GB '301) in view of European patent document 0 058 125 (EP '125) and Hale (U.S. Pat. No. 3,816,081)

With respect to claims 1, 13, 14 and 33, GB '301 discloses a rotary cone drill bit with inserts formed from tungsten carbide cemented with Co, Ni or Fe suitable for rock bit drilling (abstract). The rotary cone rock bit comprises a bit body and legs having the tungsten carbide inserts (p. 3 line 35 – p. 4 line 14). GB '301 discloses that the cemented tungsten carbide is made by sintering tungsten carbide powder with a binder of Co, Ni or Fe, preferably Co (p. 5).

GB '301 does not recite a binder alloy comprising 10-30 wt% Co (claim 1), 10-40 wt% Ni (claims 7, 19 and 37), iron, carbon and manganese (claim 1) or that the binder represents 10-30 wt% of the total cermet material.

EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder (i.e. cermet) where the matrix represents between 3 and 20 wt% and consists of about 5-20 wt% Ni, 5-20 wt% Mn, up to 2% C, and balance iron (p. 9 lines 1-5) useful for drilling through rock (p. 9 lines 23-25) and where the composite is sintered (p. 9 lines 29-33). EP '125 teaches that this alloy produces cemented tungsten carbides superior in wear resistance, overall and fracture toughness than using cobalt alone for the binder (p. 8 and Fig. 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an alloy of Ni, Mn, C and Fe as taught by EP '125 in the rock bit of GB '301 since EP '125 discloses that this results in superior wear resistance, overall and fracture toughness which is desired in GB '301. Further, the use of between 3 and 20% binder (i.e. matrix) material as taught by EP '125 would have been obvious in GB '301 since EP '125 teaches this ratio for a similar application. The range of 3 to 20 wt% binder overlaps the claimed range of 10 to 30%; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use between 10 and 20 wt% binder since EP '125 discloses equal utility over the range of 3 to 20%.

GB '301 in view of EP '125 does not disclose the addition of from 10 to 30 wt% Co to the metallic matrix.

Hale discloses a cemented tungsten carbide in an iron –carbon matrix, and discloses that the addition of nickel and cobalt to the essential Fe-C matrix improves abrasion resistance and strength (title, abstract and col. 2 lines 25-42). Hale discloses that the addition of between 5 and 15 wt% Co to the matrix improves abrasion resistance and strength (col. 2 lines 43-48). Improvement of strength and abrasion resistance would have been an obvious modification to materials used for drilling rocks. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 5 and 15 wt% Co as taught by Hale to the binder matrix of GB '301 in view of EP '125 to improve strength and abrasion resistance as taught by Hale and desired in GB '301. The range of 5 and 15 wt% Co overlaps the claimed range of 10 to 30 wt%; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

Although GB '301 in view of EP '125 and Hale does not recite that the binder phase has a CTE of less than about 10 ppm/°C within a temperature range of from 100-700°C (claims 1 and 20) or less than about 5 ppm/°C (claim 11) or less than about 2 ppm/°C (claims 12, 21 and 34) or less than that of conventional WC-Co at the same temperature and having the same metal content at a temperature range of from 100-700°C (claim 14), however such would be expected since the alloy of GB '301 in view of EP '125 and Hale closely matches the instant claimed composition. When prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present (see M.P.E.P. 2112.01 II).

With respect to claims 25-27, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% and consists of about 5-20 wt% Ni, 5-20 wt% Mn, up to 2% C, and balance iron (p. 9 lines 1-

5) useful for drilling through rock (p. 9 lines 23-25) and where the composite is sintered (p. 9 lines 29-33). Tungsten carbide disclosed by EP '125 corresponds to the "first phase" in instant claim 27. Instant claim 25 defines the "second phase" as a mixture of metals selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, C, B, Cr and Mn and the "third phase" as selected from the group of materials consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb, alloys thereof and alloys with materials selected from the group consisting of B, Cr and Mn, and further recites that first and second phase particles are distributed within the third phase. The elements Fe, C and Mn disclosed in EP '125 are broadly interpreted as the "second phase" with Ni as the "third phase." The Co addition taught by Hale could be considered part or all of either the second or third phase, since Co is recited as in each. Since EP '125 discloses that the composition is mixed then sintered (p. 9 lines 25-33), particles of the first and second phases would be disbursed within the third phase.

Although EP '125 does not recite that the binder phase has a CTE of less than about 10 ppm/°C within a temperature range of from 100-700°C (claim 25) or less than conventional WO-Co at the same temperature and having the same metal binder content (claims 26 or 42) or less than about 6 ppm/°C (claim 27), such would be expected since the alloy of EP closely matches the instant claimed composition. When prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present (see M.P.E.P. 2112.01 II).

With respect to claim 32, EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder where the matrix represents between 3 and 20 wt% which overlaps the instant range of 1 to 30% binder; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

Claims 1, 7, 11-14, 19-21, 25-27, 29, 32-34, 37 and 41-43 are rejected under 35 U.S.C. 103(a) as obvious over Fang et al. (U.S. Pat. No. 5,880,382) in view of European patent document 0 058 125 (EP '125) and Hale (U.S. Pat. No. 3,816,081).

Fang et al. discloses a low CTE cermet (col. 7 lines 5-10) of a double-cemented carbide composites (abstract) comprising:

1. Grains, where the grains are carbides, preferably tungsten carbides (abstract and col. 2 lines 21-33), which correspond to the "first phase" or "cores" of the instant claims.
2. A first ductile phase material bonding the grains selected from the group consisting of Co, Ni, Fe alloys thereof and alloys with materials selected from the group consisting of C, B, Cr, Si and Mn where Co is the preferred first ductile phase (abstract and col. 2 lines 21-33), which corresponds to the "second phase" or "a binder alloy" of the instant claims, and
3. A second ductile phase selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb and alloys thereof with materials selected from the group consisting of C, B, Cr and Mn where cobalt is the preferred ductile phase (col. 2 lines 33-42) which corresponds to the "third phase" or "binder material that is different from that of the binder alloy" in the instant claims.
4. Selection of a low thermal expansion ductile binder of less than about 8 μm/m-K (i.e. ppm/K or ppm/°C) so that the binder is thermally compatible with the hard phase particles (col. 7 lines 1-20).

Although an alloy of Fe, Co, Ni, C and Mn is within the scope of the composition disclosed by Fang et al for the first ductile phase, Fang et al. does not specifically recite that the composition comprises 10-30% Co (claims 1, 14, 29 and 33), 10-40 % Ni (claims 7, 19, 29 and 37) or that the binder represents 10-30 wt% of the total cermet material (claims 1 and 14) or 1-30 wt% of the total cermet material (claim 32).

EP '125 discloses a cemented composite comprising tungsten carbide within a metallic matrix binder (i.e. cermet) where the matrix represents between 3 and 20 wt% and consists of about 5-20 wt% Ni, 5-20 wt% Mn, up to 2% C, and balance iron (p. 9 lines 1-5) useful for drilling through rock (p. 9 lines 23-25) and where the composite is sintered (p. 9 lines 29-33). EP '125 teaches that this alloy produces cemented tungsten carbides superior in wear resistance, overall and fracture toughness than using cobalt alone for the binder (pp. 7-8 and Figs. 1 and 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an alloy of Ni, Mn, C and Fe as taught by EP '125 in the rock bit of Fang et al. since EP '125 discloses that this results in superior wear resistance and fracture toughness which is desired in Fang et al. Further, the use of between 3 and 20% binder (i.e. matrix) material as taught by EP '125 would have been obvious in Fang et al. since EP '125 teaches this ratio for a similar application. The range of 3 to 20 wt% binder overlaps the claimed range of 10 to 30% (claims 1 and 14) and 1 to 30% (claim 32); therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

Fang et al. in view of EP '125 does not disclose the addition of from 10 to 30 wt% Co to the metallic matrix.

Hale discloses a cemented tungsten carbide in an iron –carbon matrix, and discloses that the addition of nickel and cobalt to the essential Fe-C matrix improves abrasion resistance and strength (title, abstract and col. 2 lines 25-42). Hale discloses that the addition of between 5 and 15 wt% Co to the matrix improves abrasion resistance and strength (col. 2 lines 43-48). Improvement of strength and abrasion resistance would have been an obvious modification to materials used for drilling rocks. It would have been obvious to one of ordinary skill in the art at the time the invention was made to add between 5 and 15 wt% Co as taught by Hale to the binder

matrix of Fang et al. in view of EP '125 to improve strength and abrasion resistance as taught by Hale and desired in Fang et al. The range of 5 and 15 wt% Co overlaps the claimed range of 10 to 30 wt%; therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to select an alloy from the group of first ductile phase alloys having CTE of < 8 ppm/ °C since Fang et al. teaches the use of this limit to ensure thermal compatibility of the composite. The range of < 8 ppm/ °C is within the range of < 10 ppm/ °C (claims 1, 20, 25 and 43), is less than that of conventional WC-Co (claims 26 and 42) and overlaps the claimed range of < 6 ppm/ °C (claims 27 and 33), < 5 ppm/ °C (claim 11) or < 2 ppm/ °C (claims 12, 31, 34 and 44); therefore a prima facie case of obviousness exists (M.P.E.P. § 2144.05). It would have been obvious to one of ordinary skill in the art at the time the invention was made to select an alloy having CTE of 6 ppm/ °C or less since Fang et al. teaches equal utility over the range of < 8 ppm/ °C.

With respect to claims 13 and 33, Fang et al. discloses that the cemented carbide composition is suitable for use as tools such as inserts of roller cone drill bits having a body and 3 legs (col. 14 lines 1-15 and Fig. 7).

With respect to claim 41, Fang et al. discloses a further ductile phase ("second ductile phase" in Fang et al.) selected from the group consisting of Co, Ni, Fe, W, Mo, Ti, Ta, V, Nb and alloys thereof with materials selected from the group consisting of C, B, Cr and Mn as discussed above regarding claims 1 and 33.

With respect to claim 43, the WC particles of Fang et al. correspond to "cores"; the first ductile phase corresponds to "a binder alloy". The WC and first ductile phase form a cermet. The second ductile phase of Fang et al. corresponds to the "binder material that is different from that of the binder alloy." The first ductile phase of Fang et al. would form a "shell" around the WC. The

second ductile phase of Fang et al. would form a "shell" around the WC-first ductile phase material.

Response to Arguments

Applicant's arguments filed 08/02/2007 regarding maintained rejection grounds have been fully considered but they are not persuasive.

Arguments are summarized as follows:

1. GB '654 fails to disclose or suggest the addition of Mn in a cermet.
2. GB '654 and EP '125 fail to disclose the purpose of using an alloy for making a cemented carbide having improved thermal properties.
3. The '125 patent makes it clear that the intent is metallic alloys that replace the conventional WC-Co materials, therefore the '125 patent teaches away from the GB '654 patent.
4. There is nothing to suggest that the benefits gained by using Mn in the '125 patent would be present when Mn is used with a Co-containing binding material.
5. Fang, the '301 patent or Liang does not disclose the claimed composition.

Response to arguments:

1. Examiner has acknowledged this and cited the teaching of EP '125 as motivation to add Mn to GB '645 (p. 9 of 10/24/2006 Office action).
2. The fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).
3. EP '125 teaches that an alloy composition of Fe, Ni, Mn and C has superior properties to the conventional use of 100% Co in cemented carbides. GB '654 is not drawn to a conventional WC-Co composition (i.e. where Co is 100% of the binder), but rather an alloy consisting of Fe, Ni, Co and C and provides an example where Co is 10% (see p.

8 of 10/24/2006 Office action). Examiner does not agree that EP '125 teaches away from the alloy disclosed in GB '654.

4. In both EP '125 (where addition of Mn is taught) and GB '654, the primary element in the binder is iron. Both EP '125 and GB '654 also disclose that the alloy beneficially contains Ni and C. The addition of Co to GB '654 is relatively minor, therefore one of ordinary skill in the art would have reasonable expectation of success in combining Mn as taught by EP '125 with the alloy of GB '654.
5. GB '654 in view of EP '125 discloses the claimed composition as discussed above in response to arguments 1-4 and in the grounds for rejection regarding the amended limitations. Fang et al., GB '301 or Liang et al. are cited as secondary references teaching that similar compositions are used as cutting inserts as discussed on p. 11 of the 10/24/2006 Office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would

like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM
09/27/2007

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